Syllabus for the Post of Junior Technical Assistant (Surveying)-Level A1

Essential Qualification: High School or Class X Equivalent Board Examinations with Science and Trade certificate in surveying.

Part (A): General Mental Ability and Aptitude	20% (20 questions carrying 1 mark each)

General Mental Ability and Aptitude to test the following:

- Interpersonal Skills
- Logical reasoning/Analytical/Comprehension ability
- Basic Numeracy and Data Interpretation Skills
- General Awareness

Part (B): Subject/Domain Related	80 % (80 questions carrying 1 mark each)

1. Importance of survey or trade Job after completion of training. Introduction of First aid. List of the instrument equipments to be used during training · Layout of drawing sheet. Dimensions of drawing sheet.

2. Details layout of lettering, lines & dimensioning system. Introduction of surveying, types of surveying, use, application principal. Knowledge of different types of scales, determine of R.F & uses of scales. Different types of projection views orthographic, sectional, isometric view. Use & application of conventional signs & symbols.

3. Uses of Chain/ tape, testing of a chain & correction. Ranging (direct & indirect), Principle of chain survey, application. Terms used in chain survey, offset, types of offsets, limit of offset, field book, types of field book, entry of field book method of chaining in slopping ground. Field procedure of chain survey errors in chain survey, plotting procedure. Calculation of area (regular & irregular figure). Knowledge of site plan.

4. Basic terms used in compass survey. Instrument & it setting up. Conversion of bearing web to R.B. Calculation of included angle from bearing local attraction, magnetic declination and true bearing, closing error. Adjustment of closing error, precaution in using prismatic compass.

5. Introduction to Auto CAD. Use AutoCAD command.

6. Plane table survey, principle, merits & demerits. Instrument used in plane table survey setting up the plane table(centering, levelling, orientation). Methods of plane table survey (radiation, intersection, resection, traversing). Error in plane table survey.

7. Introduction to Theodolite. Types of Theodolite, parts of Theodolite, Terms used in Theodolite survey. Temporary adjustment of Theodolite, Angle measurement process. Reading of angles, field book entry of measured angles. Permanent adjustment of Theodolite. Traversing using theodolite (closed & open), traverse computation, determination of consecutive coordinates, independent co-ordinate, checking &

balancing of traverse, preparation of gales traverse table, computation of area using co-ordinates, calculation of omitted measurement.

8. Introduction to levelling. Types of levelling instrument. Technical terms used in levelling Temporary & permanent adjustment. Different types of levelling Entry of level book. (Reduced level calculation method) Curvature & refraction effect sensitivity of bubble tube. Common error and their elimination. Degree of accuracy.

9. Introduction of tachometry & terms use advantages and disadvantages. Tachometric constants & its determination. Determination of horizontal & vertical distances by various methods

10. Use AutoCAD command for drawings.

11. Contouring, contour interval selection of contour interval, characteristics of contour, uses of contour contouring by various method. Interpolation of contour by various methods, drawing of contours, computation of volume establishment of gradient by abney level.

12. Curves, Purpose, Types of curves – simple, compound, reverse, transition, vertical. Elements of simple curve, computation of elements of simple curve. Various methods for setting out simple, compound, reverse, transition & vertical curve

13. Familiarization with modern survey instruments. Parts of Total station, temporary adjustment of T.S, working procedure of T.S.

14. Familiarisation with cadastral map, term used in cadastral survey, preliminary knowledge for prepare a site plan. Calculation of area by digital planimeter.

15. Types of surveys for location of a road. Points to be considered during reconnaissance survey. Classification of roads and terms used in road engineering, alignment of roads relative importance of length of road, height of embankment depth of cutting & filling, road gradients super elevation etc

16. Details knowledge for preparation of topographical map. Details knowledge for preparation of cadastral map. Details knowledge for preparation of a road project.

17. Use auto cad command survey software for survey drawing.

18. Importance of cartographic projection. Uses of various types of cartographic projection for mapping

19. Introduction of GIS& GPS. Elements of GPS/DGPS. Observation principles. Sources of error & handling of error in GPS. Various type of GPS application. Concept & use of survey software

20. Introduction to hydrographic survey, practice various method s of water depth measurement process, floe velocity measurement & determination of cross-sectional area of a river. Handling of eco sounder, current meter.

21. Basic terms used in transmission line survey, justification criteria for constructing new line, marking process of tentative alignment, selection process of a good alignment. Process of detail survey & final location survey. Use of sag template, various type of tower, construction of tower foundation.
22. Basic terms used in railway line project survey, justification criteria for constructing new line, marking process of tentative alignment, selection process of a good alignment. Process of detail survey & final location survey.

23. Specification & uses of various types of building materials, types of foundation, knowledge of R.C.C. works, & other construction related items. Procedure of prepare a detail estimate.

24. **Workshop Science and Calculation** :
    - Introduction to Iron and Steel. Differences in Iron & steel.
    - Introduction to Property and uses of C.I. and wrought Iron. , Iron and steel properties and uses.
    - Properties and uses of plain carbon steel and alloy steel.
    - Properties and uses of non ferrous metals and alloys Fraction and decimal - conversion fraction decimal and vice-versa.
    - Properties and uses of copper, zinc, lead, tin, aluminum.
    - Composition, properties and uses of brass, bronze, solder, bearing material, timber, rubber etc.
    - System of units, British, metric and SI units for length, area, volume capacity, weight, time, angle, their conversions. , Effect of alloying elements in the properties of C.I. & steel.
    - Unit of temperature for & related problems. Standard & absolute temp.
    - Mass, volume, density, weight, sp. Gravity & specific weight. S.I. M.K.S. and F.P.S. units of force, weight etc. their conversion to related problems.
    - Inertia, rest and motion, velocity and acceleration.
    - Types of forces, its units and Weight calculation.
    - Revision & Test , Power and roots Factor, Power base exponents number. Multiplication and division of power and root of a number. Square root of number and problems.
    - Heat & temperature, thermometric scales, their conversions.
    - Work energy and power, their units and applied problems.
    - Percentage, changing percentage to decimal and fraction and vice versa. Applied problems.
    - Problem on percentage related to trade.
    - Different types of loads, stress, strain, modulus of elasticity. Ultimate strength, different types of stress, factor of safety, examples.

- Ratio & proportion- Ratio, finding forms ratio proportions, direct proportion and indirect proportion. Application of ratio and proportion & related problems.

Note: The above syllabus is indicative and the questions in the test may include similar other topics pertaining to the level and content of essential qualification.